REMARKS

I. Status of the Claims

Claims 1-20 are pending in this application. Claims 1, 8, 10, and 17 are amended in this response. Support for the current amendments is found in the application at page 3, line 16 and the Examples. Claim 17 now depends from claim 10, whereas it previously depended from claim 1. Claims 1-20 remain for consideration.

II. Response to the Section 103(a) Rejections

A. Rejection over Wulff in view of Sato

Applicant traverses the rejection of claims 1-20 under 35 U.S.C. § 103(a) as unpatentable over Wulff et al. (U.S. Pat. No. 4,367,342) in view of Sato et al. (JP 4-352771), and he respectfully asks the Examiner to reconsider and withdraw the rejection in view of the following remarks.

"A proper analysis under § 103 requires, inter alia, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success." *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991). The cited patents neither suggest Applicant's claimed invention, nor would give one of ordinary skill a reasonable expectation that the claimed process would be successful.

The present invention is a process for producing a noble metal-containing titanium zeolite, which comprises reacting a titanium compound, a silicon source a templating agent, and a noble metal (Pd, Pt, and/or Au) source at a temperature and for a time sufficient to form a molecular sieve (claims 1-9). The current application also provides a process comprising reacting an olefin, hydrogen, and oxygen in the presence of a noble metal-containing titanium zeolite wherein the noble metal-containing titanium zeolite is produced by reacting a titanium compound, a silicon source, a templating agent, and a noble metal (Pd, Pt, and/or Au) source at a temperature and for a time sufficient to form a molecular sieve (claims 10-20).

Applicant respectfully suggests that Wulff is not a proper basis for an obviousness rejection since Wulff teaches a significantly different epoxidation process using a very different catalyst than currently claimed processes. Unlike Applicant's claimed epoxidation process that requires reacting olefin, hydrogen, and oxygen, Wulff teaches the epoxidation of olefins with a hydrocarbon hydroperoxide (in particular, tertiary butyl hydroperoxide and ethylbenzene hydroperoxide). One of ordinary skill in the art would not take from the teachings of Wulff that one could substitute oxygen and hydrogen in place of hydrocarbon hydroperoxide since the Wulff catalyst lacks a component to convert oxygen and hydrogen to an oxidizing agent.

Concerning the catalyst taught in Wulff, Examiner acknowledges that Wulff does not teach using a noble metal to make the catalyst. More importantly, the catalyst taught in Wulff does not even comprise a titanium zeolite (as required in Applicant's claimed process), but rather comprises an inorganic oxygen compound of silicon in chemical combination with an oxide or hydroxide of titanium (at Col. 2, l. 26-29). The oxygen compound of the silicon is an inorganic siliceous solid containing a major proportion of silica (at Col. 2, l. 40-41). The inorganic siliceous solid taught in Wulff is preferred to be an amorphous (i.e., non-zeolitic) solid. See Col. 3, l. 29-31. The only crystalline solids taught by Wulff are "naturally-occurring mineral silicates ... such as asbestos materials...; clay minerals...; micaceous minerals... and vermiculete" (see Col. 3, l. 21-28). Lastly, no templating agent is used in the preparation of catalyst taught by Wulff.

Thus, the catalyst taught by Wulff does not comprise a titanium zeolite and is distinctly different from those produced and required by the currently claimed processes. One of ordinary skill in the art would therefore not use Wulff as a basis for preparing a noble metal-containing titanium zeolite and using the catalyst in an epoxidation process that comprises reacting an olefin, hydrogen and oxygen.

Secondly, Sato does not suggest the catalyst preparation process of Applicant's invention. The currently claimed process is a single-step synthesis for producing a noble metal-containing titanium zeolite, which comprises reacting a titanium compound, a silicon source, a templating agent, and a noble metal source at a temperature and for

a time sufficient to form a molecular sieve. In comparison, Sato does not teach a single-step process. As Examiner has acknowledged, Sato only teaches adding a palladium compound to a preformed titanium silicalite. Sato does not teach, nor suggest, preparing a noble metal-containing titanium zeolite by a single-step method.

Therefore, Sato does not teach a single-step catalyst preparation method and Wulff does not teach a titanium zeolite, let alone a noble metal-containing titanium zeolite. In addition, Wulff teaches the epoxidation of olefins with hydrocarbon hydroperoxides as opposed to Sato which teaches the reaction of olefins, hydrogen and oxygen. Because the catalysts of Wulff and Sato are distinctly different, and the epoxidation processes of Wulff and Sato are distinctly different, their teachings are not properly combinable to a person skilled in the art.

Although Examiner argues that Wulff teaches the "reacting of the Ti source, the Si source and the other metal source to make the titanium silicalite extra metal compound" (May 10, 2005 Office Action), Wulff does not teach a titanium zeolite such as titanium silicalite, as discussed above. In fact, not only does Wulff fail to teach how to make a titanium zeolite, Wulff does not teach reacting all ingredients as required in Applicant's currently claimed process. Wulff teaches the addition of titanium tetrachloride and other metal (Mg, Zr, Nb, B, Sn) chlorides to a solid silica support (at Col. 11, l. 13 to Col. 12, l. 13). This is similar to the catalyst preparation method taught in Sato which adds a palladium compound to a solid titanium silicalite. Thus, Wulff does not teach a single-step method, but rather teaches an analogous second step in which the active metal compounds (at least those active in the epoxidation of olefins with hydrocarbon hydroperoxides) are added to a preformed silica support.

In addition, Wulff only teaches that the catalyst composition may incorporate "non-interfering substances, especially those that are inert to the reactants and products" (see Col. 4, l. 58-60). Components such as niobium oxide may be added "so long as they do not interfere with the catalytic activity of the titania/silica catalytic combination" (at Col. 4, l. 60-64). This contrasts with the catalysts of Sato which contains Group VIII metals such as Pd, Pt, Ir, Rh, and Ru, since the Group VIII metal

component is required and necessary as an active participant in the chemical reaction (i.e., activating molecular oxygen and hydrogen).

In sum, the prior art would not have suggested to those of ordinary skill in the art that they should carry out Applicant's claimed process. Sato does not teach, nor suggest, a single-step preparation method to produce a noble metal-containing titanium zeolite. Wulff does not teach a titanium zeolite, let alone a noble metal-containing titanium zeolite, nor does Wulff teach a single-step procedure to make a titanium-other metal/silica catalyst.

B. Rejection over Wulff in view of Bowman

Applicant traverses the rejection of claims 1-20 under 35 U.S.C. § 103(a) as unpatentable over Wulff et al. (U.S. Pat. No. 4,367,342) in view of Bowman et al. (WO 98/00414), and he respectfully asks the Examiner to reconsider and withdraw the rejection in view of the following remarks.

Like the combination of Wulff and Sato, a combination of Wulff and Bowan does not suggest, nor give one a reasonable expectation of success for using, Applicant's claimed processes.

As with Wulff and Sato, the teachings of Wulff and Bowman are not properly combinable to a person or ordinary skill in the art due to the dissimilar catalysts and dissimilar epoxidation processes of the cited references. As discussed above, Wulff teaches a significantly different epoxidation process using a very different catalyst than the currently claimed processes. Bowman discloses an epoxidation process that comprises reacting an olefin, hydrogen and oxygen in the presence of a gold on titanium silicalite catalyst. However, Bowman, like Sato, does not teach a single-step process to make the Au/titanium silicalite, but rather teaches the addition of gold to the preformed titanium silicalite.

Thus, Bowman does not teach a single-step catalyst preparation method and Wulff does not teach a titanium zeolite, let alone a noble metal-containing titanium zeolite. In addition, Wulff teaches the epoxidation of olefins with hydrocarbon

hydroperoxides as opposed to Bowman which teaches the reaction of olefins, hydrogen and oxygen.

In sum, a combination of either Wulff and Sato or Wulff and Bowman does not suggest, nor give one a reasonable expectation of success for using, Applicant's claimed epoxidation process or process for producing a noble metal-containing titanium zeolite.

III. Pirutko Article

Applicant has filed an Information Disclosure Statement and Certification under 37 C.F.R. § 197(c) and (e)(1) containing the corresponding PCT International Search Report. The cited Pirutko et al. "Preparation and catalytic study of metal modified TS-1 in the oxidation of benzene to phenol by N2O" article is discussed herein.

Although Pirutko is directed specifically to the introduction of iron into the TS-1 matrix, Pirutko also teaches the synthesis of Ru-modified TS-1. Applicant's currently claimed process for producing a noble metal-containing titanium zeolite is now limited to palladium, platinum, and gold. Thus, Applicant's claimed catalyst production process is novel over Pirutko. In addition, Pirutko teaches that Ru-modified TS-1 "do not exhibit activity" in the production of phenol by the oxidation of benzene (see page 352). On account of the lack of activity in this oxidation reaction, one of ordinary skill in the art would not be motivated to produce a palladium, platinum, and/or gold-containing titanium zeolite in a single-step synthesis.

In addition, Applicant's claimed epoxidation process is both novel and non-obvious over the Pirutko article as Pirutko teaches only the oxidation of benzene. The failure of the Ru-modified TS-1 to produce phenol by the oxidation of benzene would not have suggested to those of ordinary skill in the art that they should carry out the claimed epoxidation process, nor would it have revealed a reasonable expectation of success in so carrying out the claimed epoxidation process.

In view of the foregoing, Applicant respectfully asks the Examiner to reconsider and withdraw the rejections and pass the case to issue. Applicant invites the Examiner to telephone his attorney at (610) 359-3480 if he believes that a discussion of the application might be helpful.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail, with sufficient postage, in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on August 10, 2005.

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